UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, ILLINOIS 60604

SUBJECT:	CLEAN AIR ACT INSPECTION REPORT Knauf Insulation, Shelbyville, Indiana
FROM:	Sasha Letuchy, Environmental Engineer AECAB (MI/WI)
THRU:	Sarah Marshall, Section Supervisor AECAB (MI/WI)
TO:	File

BASIC INFORMATION

Facility Name: Knauf Insulation

Facility Location: 400 E. Walker Street, Shelbyville, Indiana (Plant 1)

Date of Inspection: 10/28/2022

EPA Inspector(s):
1. Sasha Letuchy, Environmental Engineer
2. Valeria Apolinario, Environmental Engineer

Other Attendees:
1. Jamie Cain, Corporate EH Manager
2. Adam Estes, Technical Specialist, Corporate HSE
3. Andy Linville, Sr. HSE Manager, Plant 1
4. Jon Rost, Manager, Process Engineering

Contact Email Address: Adam.estes@knaufinsulation.com

Purpose of Inspection: To assess compliance with the facilities Title V Permit and Clean Air Act Regulations

Facility Type: Wool fiberglass manufacturing

Regulations Central to Inspection: National Emission Standards for Hazardous Air Pollutants (NESHAP) for Wool Fiberglass Manufacturing at 40 C.F.R. Part 63, Subpart NNN; New Source Performance Standards for Wool Fiberglass Manufacturing at 40 C.F.R. Part 63, Subpart PPP

Arrival Time: 8:30 am ET
Departure Time: 1:18 pm ET

Inspection Type:

☒ Unannounced Inspection

☐ Announced Inspection

OPENING CONFERENCE

☒ Presented Credentials
☒ Stated authority and purpose of inspection
☒ Provided Small Business Resource Information Sheet Emailed after returned to office.
☐ Small Business Resource Information Sheet not provided.
☒ Provided CBI warning to facility

The following information was obtained verbally from facility personnel unless otherwise noted.

Process Description:
Plant 1 of Knauf Insulation (Knauf) manufacturers several varieties of fiberglass insulation, including loose fill, uncured, and phenol-formaldehyde (P-F) cured. Raw materials, including sand, limestone, borax, soda ash, dolomite, and cullet are stored in silos and tanks in a raw material storage building which also contains mixers. The raw materials are conveyed, weighed, and blended in the mixers. Once the materials are mixed, they are fed into one of two Plant 1 cold-top electric melt furnaces (emission unit 602B furnace and emission unit 611 furnace). In the furnaces, the raw materials are heated using electrodes and transformed into molten glass. Next, in the forming process, the molten glass is formed into thin strands or fibers of molten glass using spinning machines (emission unit MFG 602 and 602 LF MFG associated with the 602B furnace; and emission units 611 forming, 612 forming, 613 forming, and 614 forming associated with the 611 furnace). Directly after forming the fibers, a chemical binder is sprayed onto the fibers. Two types of resin are used at the plant – P-F resin and a proprietary corn syrup-based binder called Ecos. At emission unit 602 LF, no binder is applied. The fibers are collected by gravity on a conveyor belt to form a mat. The formed mat then proceeds to one of three curing ovens in order to cure the binder (emission unit 602 curing oven associated with MGF 602 and the 602B furnace; or emission units 613 curing oven or 614 curing oven associated with 611 forming, 612 forming, 613 forming, and 614 forming, and the 611 furnace).

Emissions from the operations are controlled with WESPs, an RTOs, and baghouses.

Particulate emissions from the furnaces are controlled by baghouses (baghouse 602B Furnace for the 602B Furnace, exhausting at Stack 6-30 and baghouse Furn 611, exhausting at Stack 6-21).

The facility operates bag leak detection systems on these baghouses. The systems alarm daily, normally due to moisture. Baghouses are inspected annually by a third party, but the facility recently switched to a semi-annual schedule. Baghouses may need to be bypassed during startup and shutdown.

Particulate matter emissions from the forming processes (611 forming, 612 forming, 613 forming, and 614 forming) are controlled by one WESP, which exhausts at Stack 6-22. This WESP contains eight zones. The facility monitors primary and secondary voltage, primary and secondary current, and primary and secondary corona power, and primary and secondary spark rate. A minimum secondary voltage is the primary parameter used for compliance and the set point is established during stack testing. The quality assurance lab also tests the recirculated water for solid content. Emissions from emission units MFG 602 and 602 LF MFG are controlled by a two WESPs, which exhausts at Stack 2-2. Preventative maintenance on the WESPs is conducted in-house. Method 22 visible emission checks are conducted on the WESP. Normal emissions were described as a poof and sustained viewing with no emissions.

Emissions from 613 curing oven and 614 curing ovens are controlled by two regenerative thermal oxidizers (RTOs). Emissions exhaust at Stack 6-29. Temperature and duct static pressure at the inlet and outlet of the RTO is monitored and recorded. A variable speed fan on the RTO self-adjusts to changes in duct static pressure. The facility has conducted stack testing using only one RTO to control both ovens. Maintenance/inspections of the RTO are done on an as needed basis.

TOUR INFORMATION

EPA Tour of the Facility: Yes

Data Collected and Observations:
Prior to entering Plant 1, EPA observed visible emissions from Stack 2-2 and took photos.

Facility personnel showed the EPA inspectors the PLC system, including a furnace temperature screen showing that the temperature is monitored and recorded instantaneously.

EPA toured the facility, starting the 611 furnace, 602B furnace, then proceeding to the spinners, 614 curing oven, and 602 curing oven. EPA also observed various stacks at the facility from the roof, toured the mixing building, and the observed the exterior of the WESPs, baghouses, and RTO.

During the tour, EPA noted that particulate emissions capture at 602B furnace was worse than at 611 furnace. Particulate emissions were also deposited on the floor in front of the furnace and on the ledge around the furnace.

EPA also noted opacity from Stack 6-22 and Valeria Apolinario took opacity readings. While Valeria Apolinario was taking opacity readings, Sasha Letuchy observed visible emissions escaping a port/window on the conveyor from the mixer to the furnace feed. Facility personnel took actions to address this concern during the inspection.

During the inspection, Sasha Letuchy used an Optical Gas Imaging FLIR camera to evaluate capture at the inlet to the 614 curing oven. EPA observed hydrocarbons escaping the capture system and showed Adam Estes the imaging that EPA was seeing using the FLIR. 613 curing oven was down during the inspection.

Photos and/or Videos: were taken during the inspection.

Field Measurements: were taken during this inspection. Visible emission data sheets are attached.

CLOSING CONFERENCE

☒ Provided U.S. EPA point of contact to the facility

Concerns: EPA noted the following concerns and communicated them to facility personnel during the tour and again during the closing conference:

1) Visible emissions observed at Stack 2-2 (prior to entering the building). EPA showed the company the videos and photos and the facility stated that these were abnormal visible emissions.
2) Hydrocarbons observed escaping the capture system at the inlet to the 614 curing oven.
3) Visible emissions observed escaping a port/window on the conveyor from the mixer to the furnace feed. Facility personnel took actions to address this concern during the inspection.
4) Visible emissions observed at the WESP stack, 6-22, and Method 9 conducted.
5) Capture of particulate emissions at 602B furnace was worse than at 611 furnace. Particulate emissions were deposited on the floor in front of the furnace and on the ledge around the furnace.
6) 40 C.F.R. § 63.1383(g)(2) requires, at minimum, comprehensive annual inspections for the RTOs that may not be covered under the Knauf's current as needed maintenance.
7) 40 C.F.R. § 63.1382(c)(3) requires three hour block average records of temperature above the furnace, but the company indicated it is currently collecting instantaneous readings.

Following the closing conference and after exiting the facility, EPA conducted additional Method 9 readings of Stack 6-22.

DIGITAL SIGNATURES

Report Author: ALEXANDRA LETUCHY Digitally signed by ALEXANDRA LETUCHY Date: 2022.12.09 10:04:34 -06'00'

Section Supervisor: SARAH MARSHALL Digitally signed by SARAH MARSHALL Date: 2022.12.09 10:36:57 -06'00'

APPENDICES AND ATTACHMENTS

1. Appendix A: Digital video log
2. Appendix B: Visible Emission Sheets

Facility Name: Knauf
Facility Location: 400 E. Walker Street, Shelbyville, Indiana
Date of Inspection: October 28, 2022

APPENDIX A: DIGITAL IMAGE LOG

1. **Inspector Name:** Valeria Apolinario (photos) Sasha Letuchy (FLIR videos)	2. **Archival Record Location:** Region 5 Electronic Records Center

Image Number	File Name	Date and Time (Central Time)	Description of Image
1	IMG_0283	10/28/2022 7:34 AM	Visible particulate emissions from Stack 2-2, WESP stack
2	IMG_0287	10/28/2022 7:39 AM	Visible particulate emissions from Stack 2-2, WESP stack
3	IMG_0288	10/28/2022 10:13 AM	Overview of Wool Fiberglass Production
4	IMG_0290	10/28/2022 10:26 AM	611 Furnace glass pushing
5	IMG_0291	10/28/2022 10:30 AM	Stack 6-29 for Lines 613 and 614 Curing Operations (RTO control)
6	IMG_0292	10/28/2022 10:35 AM	Visible emissions from Stack 6-22, WESP stack
7	IMG_0293	10/28/2022 10:35 AM	Visible emissions from Stack 6-22, WESP stack
8	IMG_0294	10/28/2022 10:36 AM	Visible emissions from Stack 6-22, WESP stack
9	IMG_0296	10/28/2022 11:18 AM	Furnace 602 uncaptured emissions
10	IMG_0297	10/28/2022 11:18 AM	Furnace 602 particulate buildup
11	IMG_0298	10/28/2022 11:19 AM	Furnace 602 particulate buildup
12	IMG_0299	10/28/2022 11:23 AM	Furnace 602 particulate buildup
13	IMG_0300	10/28/2022 11:26 AM	Visible emissions from Stack 2-2, WESP Stack
14	IMG_0301	10/28/2022 11:26 AM	Visible emissions from Stack 2-2, WESP Stack
15	IMG_0302	10/28/2022 11:39 AM	Visible emissions from 2-2 Stack, 6-22 stack in background
16	IMG_0303	10/28/2022 12:29 PM	Visible emissions from 6-22 stack (left) and 2-2 stack (right)
17	IMG_0306	10/28/2022 12:43 PM	Visible emissions from 6-22 stack (left) and 2-2 stack (right)
18	IMG_0307	10/28/2022 12:43 PM	Visible emissions from 6-22 stack
19	MVI_0284.MP4	10/28/2022 8:35 AM	Video of visible emissions from Stack 2-2
20	MVI_0285.MP4	10/28/2022 8:35 AM	Video of visible emissions from Stack 2-2
21	MVI_0286.MP4	10/28/2022 8:37 AM	Video of visible emissions from Stack 2-2
22	MVI_0289.MP4	10/28/2022 10:25 AM	Video of furnace 611 glass pushing
23	MVI_0295.MP4	10/28/2022 11:55 AM	Video of uncaptured emissions from curing oven 614 exit

24	MVI_0304.MP4	10/28/2022 1:29 PM	Video of visible emissions from Stack 6-22 (left) and Stack 2-2 (right)
25	MVI_0305	10/28/2022 12:30 PM	Video of visible emissions from Stack 6-22 (left) and Stack 2-2 (right)
26	DC_0565.jpg	10/28/2022 11:51 AM	Inlet to curing oven 614
27	MOV_0567.mp4	10/28/2022 12:40 PM	Video of visible emissions escaping a port/window on the conveyor from the mixer to the furnace feed.
28	SEQ_0564.seq	10/28/2022 11:50 AM	Hydrocarbons escaping from the inlet to curing oven 614
29	SEQ_0566.seq	10/28/2022 11:53 AM	Hydrocarbons escaping from the inlet to curing oven 614

VISIBLE EMISSION OBSERVATION FORM

No.

COMPANY NAME: Knauf Insulation		
STREET ADDRESS: 400 E Walker St		
CITY: Shelbyville	STATE: IN	ZIP: 46176
PHONE (KEY CONTACT):	SOURCE ID NUMBER:	

PROCESS EQUIPMENT: Stack, Main 6-22	OPERATING MODE: On
CONTROL EQUIPMENT: ~~RT~~ WESPs	OPERATING MODE: On

DESCRIBE EMISSION POINT: Stack for WESPs	
HEIGHT ABOVE GROUND LEVEL: 100Ft	HEIGHT RELATIVE TO OBSERVER: Start 95ft End 95ft
DISTANCE FROM OBSERVER: Start ~~375~~ Ft End 375ft	DIRECTION FROM OBSERVER: Start N End N

DESCRIBE EMISSIONS: Start Smokey white	End Smokey white
EMISSION COLOR: Start white End	IF WATER DROPLET PLUME: Attached ☐ Detached ☒
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start further above	End further above

DESCRIBE PLUME BACKGROUND: Start blue sky	End blue sky		
BACKGROUND COLOR: Start blue	End blue	SKY CONDITIONS: Start blue	End blue
WIND SPEED: Start 3mph	End 3mph	WIND DIRECTION: Start W	End W
AMBIENT TEMP: Start 55°	End 55°	WET BULB TEMP: 55° F	RH, percent: 57%

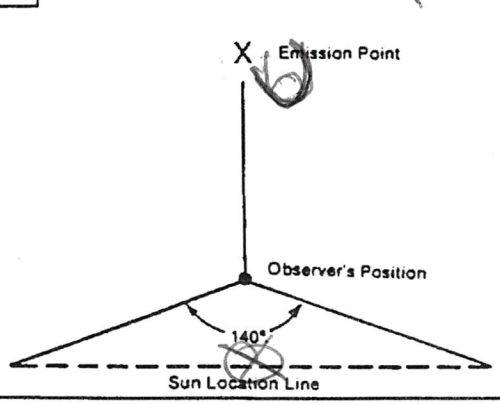
Stack with Plume

Sun

Wind

SOURCE LAYOUT SKETCH

Draw North Arrow



ADDITIONAL INFORMATION

OBSERVATION DATE	START TIME	END TIME
10/28/22	12:~~33~~ pm	12:40 pm

SEC / MIN	0	15	30	45	COMMENTS
1	10	10	15	10	
2	15	5	5	10	
3	5	5	5	5	
4	5	5	5	5	7.7%
5	5	5	10	10	
6	10	5	10	10	~~7.7%~~ 6.7%
7	5	5	5	5	
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OBSERVER'S NAME (PRINT): Valeria Apolinario	
OBSERVER'S SIGNATURE	DATE: 10/28/22
ORGANIZATION: USEPA	
CERTIFIED BY: Reviewed	DATE: 10/~~1~~6/22
CONTINUED ON VEO FORM NUMBER	

VISIBLE EMISSION OBSERVATION FORM

No.

COMPANY NAME	Knauf Insulation
STREET ADDRESS	45 E Walker St
CITY	Shelbyville
STATE	IN
ZIP	46176
PHONE (KEY CONTACT)	
SOURCE ID NUMBER	

PROCESS EQUIPMENT	6-22 stack
OPERATING MODE	on
CONTROL EQUIPMENT	wet ESP
OPERATING MODE	On

DESCRIBE EMISSION POINT	above stack
HEIGHT ABOVE GROUND LEVEL	100 ft
HEIGHT RELATIVE TO OBSERVER	Start 95ft End 95ft
DISTANCE FROM OBSERVER	Start 500ft End 500ft
DIRECTION FROM OBSERVER	Start 500ft End 500ft

DESCRIBE EMISSIONS	Start white smoke End white smoke
EMISSION COLOR	Start white End white
IF WATER DROPLET PLUME	Attached ☐ N/A Detached ☒
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	Start above 5 to the left End above

DESCRIBE PLUME BACKGROUND	Start blue sky clear End blue sky clear
BACKGROUND COLOR	Start blue End blue
SKY CONDITIONS	Start clear End clear
WIND SPEED	Start 4mph End 4mph
WIND DIRECTION	Start SW End SW
AMBIENT TEMP	Start 60° End 60°
WET BULB TEMP	55°F
RH, percent	52%

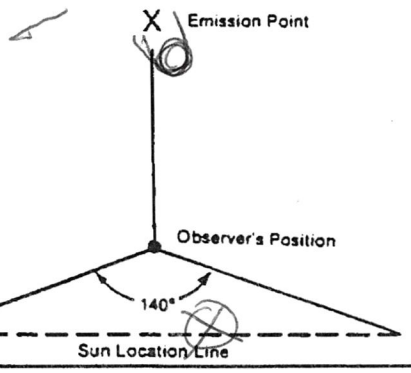
Stack with Plume

Sun

Wind

SOURCE LAYOUT SKETCH

Draw North Arrow



ADDITIONAL INFORMATION

OBSERVATION DATE	START TIME	END TIME
10/28/22	1:32pm	1:39pm

SEC / MIN	0	15	30	45	COMMENTS
1	20	15	15	20	70 —
2	15	25	25	25	90
3	25	25	25	30	105 26.7%
4	30	40	35	25	130 29.2%
5	35	25	25	30	115
6	40	35	25	30	130
7	30	25	35	40	130 —
8					
9					
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OBSERVER'S NAME (PRINT)	Valeria Apolinario
OBSERVER'S SIGNATURE	
DATE	10/28/22
ORGANIZATION	~~Aero met~~ USEPA
CERTIFIED BY	Aero met
DATE	10/6/22
CONTINUED ON VEO FORM NUMBER	